THE

ONTARIO WATER RESOURCES

COMMISSION

REPORT ON

WATER POLLUTION SURVEY

of the

SOUTH NATION RIVER

1963

REPORT

on a

WATER POLLUTION SURVEY

of the

SOUTH NATION RIVER

September 30 th to October 2 nd

1963

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SOUTH NATION RIVER

INDEX

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WATER POLLUTION SURVEY OF SOUTH NATION RIVER

INTRODUCTION

A water pollution survey of the South Nation River system, with the exception of the Scotch River, Payne River, and those sections which lie in the County of Carleton, was performed during the period from September 30th to October 2nd, 1963. The conditions in the Scotch and Payne River watersheds are outlined in separate OWRC reports dated July 23, 1963 and July 24, 1963, respectively. The County of Carleton Water Resources Survey report, prepared previous to this investigation, outlines the conditions in the watercourse within the county boundaries.

This survey was confined to sampling of the water in order to determine the sanitary quality thereof.

SOUTH NATION WATERSHED

The South Nation River drains an area of 1,511 square miles lying between the municipalities of Ottawa and Hawkesbury on the Ottawa River and Brockville on the St. Lawrence River. In shape, it may be likened to a flattened triangle with its apex near Gloucester Station, six miles south of Ottawa, and the long side, or base, running north-east from near Brockville to a point near Vankleek Hill, south-west of Hawkesbury. From south-west to north-east the watershed extends approximately 76 miles in a direct line and its greatest width, from north-west to south-east, is approximately 35 miles.

The South Nation River rises in the County of Leeds, west of the Hamlet of Algonquin and approximately eight miles north of Brockville. It flows generally in a north-easterly direction until near the Community of Pendleton in the County of Prescott. The river

here makes a wide sweep to the east, so that it is flowing in a north-westerly direction when it empties into the Ottawa River near Wendover.

The drainage area includes parts of eight counties and twenty-five townships lie wholly or partly within the South Nation River watershed. Although there are no towns or cities, the watershed does include the incorporated villages of Winchester, Chesterville, Casselman, Plantagenet, Maxville, and Finch. Many police villages and other communities are located within the watershed.

With an average drop in elevation of approximately 2.4 feet per mile throughout its length of approximately 110 miles, this river is both sluggish and subject to severe flooding upon occasion.

Throughout its course, the South Nation River is fed by many tributaries. The main tributaries are as follows:

Horse Creek
Caledonia Creek
Paxton Creek
Scotch River (North and South Branches)
Beaver Creek
Dickinson Creek
Cobb Creek
Bear Brook
North Indian Creek
South Indian Creek
Moose Creek
Wolf Creek
Castor River
East Castor River
North Castor River
Middle Castor River
South Castor River
Allen Creek
Silver Creek
Wylie Creek
Butternut Creek
Little Castor River
Payne River
South Nation River - South Branch
Sandy Creek
Black Creek

WATER USES

Municipal use of the waters of the South Nation River system is confined to the discharge of untreated or inadequately treated sanitary wastes thereto from numerous communities within the watershed. The Village of Winchester alone provides treatment for its sanitary wastes in a waste stabilization pond, the effluent, from which, is discharged to the East Castor River.

The watercourse is not used as a source of public water supply for drinking purposes by any community.

Industrial use of the South Nation River system is also important. Numerous milk processing plants discharge highly polluting industrial wastes to the river system. A few plants utilize the water in the plant processes e.g. Plantagenet Creamery and Nestles (Canada) Ltd. at Chesterville.

Recreational use is not significant.

Riparian use of the waters of the South Nation River system exists to an undetermined extent. Utilization of the waters for stock-watering purposes is of importance.

WATER FLOW

The flows in the South Nation River at Plantagenet Springs occurring during the period from October, 1960 to November, 1963, are shown in Table I which is appended to the report.

A review of this data reveals that, exclusive of when ice forms at the beginning of the year, minimum flows occur generally at the beginning of autumn. Since dilution waters for any untreated or inadequately treated wastes would be minimal during this period, then pollution would be critical at this time. It is noted that during 1963, which was a dry year, minimum flows occurred during the summer.

SAMPLING PROCEDURE

Water samples were collected from the South Nation River and its tributaries, with the exception of the sections previously mentioned, and were subsequently submitted to the Ontario Water Resources Commission Laboratory for bacterial and sanitary chemical analyses. The locations of the sampling points are shown on the appended map of the watershed.

SAMPLING CONDITIONS

During the collection of samples on September 30th, October 1st, and 2nd, generally sunny weather prevailed. Atmospheric temperatures were in the range of 50 to 80 degrees Fahrenheit. No precipitation occurred in the watershed.

The flows in the South Nation River at Plantagenet Springs during the time of sampling were as follows:

September 30, 1963	200 cfs.
October 1	226 cfs.
October 2	208 cfs.

SAMPLE RESULTS

The laboratory results pertaining to the water samples collected during this survey are found in Table II of this report. A watershed map of the South Nation River, which shows the locations of the sampling points, is included in the report.

An interpretation of the various analyses employed to assess the quality of the surface waters is also appended.

At sampling point number N-6.0, which is on the South Nation River just below the Village of Plantagenet, it is noted that the coliform content was high and the BOD approached the upper limit of 4 ppm. This is attributed to the discharge of industrial wastes from Plantagenet Creamery and sanitary wastes from Plantagenet to the watercourse.

A high coliform content is noted at sampling point number NB-34.6, which is on Bear Brook in the vicinity of Bourget. Further investigation by this Commission will be conducted to determine the source of pollution.

The high coliform content in Leonard Creek at sampling point number NBL-45.9 is attributed, in part, to the industrial waste discharges from the Greenwood Cheese Factory at Sarsfield.

The deterioration in the sanitary quality of the river water as it flows past Casselman is evidenced by a comparison of samples collected at sample point numbers N-40.0 and N-39.0, which are located upstream and downstream of Casselman respectively. This is attributed to the discharge of untreated or inadequately treated sanitary wastes from Casselman and industrial wastes from the Casselman Creamery to the South Nation River.

The high coliform content in the South Nation River at sampling point number N-40.0 upstream of Casselman is noted.

At sampling point number NR-48.6, which is on the Castor River downstream of Embrun, there was a high coliform content which may be ascribed, in part, to sanitary wastes from Embrun and industrial wastes from Plante's Cheese Factory at Embrun.

The laboratory analyses of samples collected at sampling point numbers NR-50.4 and NR-53.2 appear to indicate that the community of St. Onge and the Police Village of Russell have inadequate waste disposal facilities.

The gross pollution, evident both by visual observation and by the laboratory results, at sampling point number NREW-64.0 is caused by the discharge of industrial wastes to the watercourse by Ault's Creamery at Winchester.

The high BOD and coliform contents at sampling point numbers NRE-65.3 and NRE-64.7 at Winchester are attributed to the discharge of untreated or inadequately treated sanitary wastes to the stream. Liquid having the visual characteristics of septic tank effluent was observed entering the watercourse at two locations during the time of sampling.

The samples collected at sampling point numbers NRE-63.8 and NRE-57.4 downstream of Winchester show the effects of upstream pollution.

The high coliform content at sampling point number NL-46.6 on the Little Castor River in Cambridge Township may be attributed to industrial wastes discharged from Plante Brothers (Cambridge No. 5) Cheese Factory.

The pollution in the South Nation River at sampling point number N-47.7 at Crysler is ascribed mainly to industrial wastes discharged from Crysler Milk Products and, to a lesser extent, untreated or inadequately treated sanitary wastes from the Police Village of Crysler.

At sampling point numbers NW-71.8 and NW-71.81 west of Williamsburg, the high coliform content and BOD is attributed to untreated or inadequately treated wastes originating in Williamsburg and surface runoff. The high coliform content at sampling point number NW-69.0 downstream of Williamsburg is also attributed to these wastes.

The laboratory results of samples collected at sampling point numbers NF-69.4 on Black Creek and NK-72.7 on Inkerman Creek should be interpreted with reservation since, at the former sampling point, the water flow was minimal and, at the latter point, the creek waters were very turbid.

The sanitary quality of the waters at the remaining sampling points was satisfactory. It is noted that water quality had reached acceptable standards insofar as BOD and coliform content were concerned prior to the confluence of the South Nation River and the Ottawa River.

SUMMARY

A water pollution survey of the South Nation River system, with the exception of the Scotch River, Payne River, and those sections which lie in the County of Carleton, was conducted during the period from September 30th to October 2nd, 1963, in order to assess the sanitary quality of the waters.

The laboratory results of the samples collected revealed that some areas of pollution existed in the system. The pollution in the majority of the areas was attributed to the lack of adequate waste disposal facilities in various communities and/or industrial waste discharges from milk-processing industries. In some instances, further investigation is necessary by this Commission in order to determine the source of the pollution.

Pollution was evident in the pertinent watercourse downstream of the following centres of population:

Plantagenet
Casselman
Embrun
St. Onge
Russell
Winchester
Crysler
Williamsburg

The OWRC objectives for water quality were exceeded downstream of the following milk-processing plants:

Plantagenet Creamery
Greenwood Cheese Factory at Sarsfield
Casselman Creamery
Plante's Cheese Factory at Embrun
Ault's Creamery at Winchester
Plante Bros. (Cambridge No. 5) Cheese Factory in Cambridge Township
Crysler Milk Products

The sanitary quality of the South Nation River was satisfactory prior to the confluence of this watercourse with the Ottawa River.

The samples were collected during a period when the water flow in the South Nation River was slightly above the minimum. It is expected that, when minimum flow conditions occur, the water quality would deteriorate further and/or the number of or extent of existing areas of pollution would increase. Therefore, the need for the provision of adequate waste treatment facilities is evident.

RECOMMENDATIONS

The aforementioned centres of population and milk-processing plants should adopt adequate waste disposal methods so as to protect the quality of the pertinent watercourse in the South Nation River system.

TABLE I

SOUTH NATION RIVER

MEAN DAILY DISCHARGE AT PLANTAGENET SPRINGS

(in cubic feet per second)

Month	Mean	Maximum	Minimum	Month	Mean	Maximum	Minimum
October, 1960	45.8	119	24.5	October, 1961	73	119	57
November	109	312	59	November	149	448	61
December	68	119	46.2	December	487	2150	108
January, 1961	49.4	65	-	January, 1962	112	117	57
February	71	-	-	February	75	98	54
March	2360	13500	249	March	1770	20200	65
April	4360	9960	1780	April	9010	23100	776
May	915	2880	335	May	1090	5560	168
June	634	1740	173	June	94	162	74
July	554	1390	249	July	90	168	43
August	371	1510	127	August	73	121	35.5
September	174	478	79	September	56	90	32.5
Year	809	13500	24.5	Year	1080	23100	32.5

TABLE I cont'd.

Month	Mean	Maximum	Minimum
October, 1962	239	764	40.8
November	1270	4840	300
December	443	1640	102
January, 1963	134	164	102
February	99.3	121	82.5
March	828	14000	77.5
April	7370	30700	847
May	1810	7030	411
June	256	449	110
July	70.7	124	29.0
August	71.1	152	29.0
September, 1963	436	3130	88.5
Year	1080	30700	29.0

Month	Mean	Maximum	Minimum
October, 1963	138	272	75.0
November	1210	5800	82.5
December	not available		
January, 1964			

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

All analyses except pH reported in p.p.m. unless otherwise indicated

RIVER SURVEY

1 p.p.m. = 1 mgm. / litre = 1 lb./100,000 Imp. Gals.

Watershed: South Nation

Watercourse:

Date Sampled: Oct. 2/63 by: R. C. Manson

Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			D.O.	Sample Temp. C			Bacteriological Laboratory	
			Total	Susp.	Diss.					Lab. No.	M.F. Coliform Count per 100 ml.
N-2.3	R-5061	1.7	296	4	292					R-15908	1,300
N-6.0	R-5062	3.6	300	8	292					R-15909	4,900
N-8.0	R-5063	1.5	310	6	304					R-15910	900
NC-15.2	R-5064	3.2	648	33	615					R-15911	500
NS-21.5	R-5065	1.8	350	3	347					R-15912	730
N-20.8	R-5066	1.8	294	4	290					R-15913	310
NB-34.6	R-5067	1.8	368	8	360					R-15914	13,000
NBN-40.2	R-5075	1.8	342	19	323					R-15923	300
NBS-41.9	R-5074	1.3	220	15	205					R-15922	410
NB-44.0	R-5073	1.6	360	10	350					R-15921	380

N-2.3		South Nation River at Hwy. #17 bridge near Jessop Falls
N-6.0		" " " opposite river road west side just west of junction with Hwy. #17
N-8.0		" " " at CPR bridge - Plantagenet Springs
NC-15.2		Caledonia Creek at North Plantagenet - Alfred Township line
NS-21.5		Scotch River at side road bridge 1/2 mile north of Riceville
N-20.8		South Nation River at Johnsons Ferry
NB-34.6		Bear Brook at Concession Road 4, Clarence Twp. 1/2 mile south of Bourget
NBN-40.2		North Indian Creek at side road just east of Hammond
NBS-41.9		South Indian Creek at Concession Road 10, Clarence Township
NB-44.0		Bear Brook at Concession Road 2, Cumberland Township

TABLE II

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

All analyses except pH reported in p.p.m. unless otherwise indicated

RIVER SURVEY

1 p.p.m. = 1 mgm. / litre = 1 lb./100,000 Imp. Gals.

Watershed: South Nation

Watercourse:

Date Sampled: Oct. /63 by: R. C. Manson

Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			D.O.	Sample Temp. C	Date Sampled	Turbdiity Units	Bacteriological Laboratory	
			Total	Susp.	Diss.					Lab. No.	M.F. Coliform Count per 100 ml.
NBL-45.9	R-5072	2.4	390	4	386			2	-	R-15920	2,700
NB-49.5	R-5071	1.6	388	20	368			2	-	R-15919	110
N-39.0	R-5025	4.0	280	-	-			1	2.6	R-15829	53,000
N-40.0	R-5024	2.1	292	-	-			1	6.5	R-15844	39,000
NR-48.6	R-5028	1.8	458	-	-			1	3.3	R-15832	9,000
NR-50.4	R-5029	1.3	466	-	-			1	4.0	R-15833	5,000
NRE-50.6	R-5030	1.2	494	-	-			1	3.1	R-15834	390
NREM-53.7	R-5070	2.4	438	6	432			2	-	R-15918	140
NREM-56.8	-	-	-	-	-			2	-	R-15915	370
NRE-57.4	R-5069	6.1	776	91	685			2	-	R-15917	700
NREW-64.0	R-5017	1220	2860	714	2146			1	-	R-15837	430,000,000

NBL-45.9	Leonard Creek at Concession Road, Cumberland Township
NB-49.5	Bear Brook at Concession Road 6, Cumberland Township
N-39.0	South Nation River at dam below Casselman
N-40.0	South Nation River at Concession Road 6, Cambridge Township, just west of Casselman
NR-48.6	Castor River at Concession Road 8, Russell Township, east of Embrun
NR-50.4	Castor River just east at Concession Road 6, Russell Township
NRE-50.6	East Castor River just west of junction, at Concession Road 6, Russell Township
NREM-53.7	Marvelville Creek at Concession Road 3, Russell Township
NREM-56.8	Marvelville Creek at Russell-Osgoode Township line - just north of Marvelville
NRE-57.4	East Castor River at Russell-Winchester Township line
NREW-64.0	Winchester branch of East Castor River at Concession Road 7, Winchester Township

TABLE II - cont'd.

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

All analyses except pH reported in p.p.m. unless otherwise indicated

RIVER SURVEY

1 p.p.m. = 1 mgm. / litre = 1 lb./100,000 Imp. Gals.

Watershed: South Nation

Watercourse:

Date Sampled: Oct. /63 by: R. C. Manson

Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			D.O.	Sample Temp. C	Turbidity Units	Date Sampled	Bacteriological Laboratory	
			Total	Susp.	Diss.					Lab. No.	M.F. Coliform Count per 100 ml.
NRE-63.8	R-5018	1.7	814	-	-			9.5	1	R-15838	18,000
NRE-64.7	R-5038	18.	778	-	-			17.0	1	R-15850	75,000
NRE-65.3	R-5037	44.	1010	42	968			-	1	R-15849	33,000,000
NR-53.2	R-5031	1.0	448	-	-			1.1	1	R-15835	5,000
NR-54.5	R-5032	1.2	456	-	-			2.8	1	R-15836	130
NRS-65.2	R-5068	1.7	392	21	371				2	R-15916	60
NL-46.6	R-5026	1.1	464	-	-			3.3	1	R-15830	14,000
NL-47.2	R-5027	1.7	466	-	-			2.3	1	R-15831	330
N-44.8	R-5022	1.9	318	-	-			4.0	1	R-15842	480
NY-47.0	R-5023	1.7	422	-	-			4.0	1	R-15843	1,900
N-47.7	R-5021	17.	332	-	-			2.1	1	R-15841	180,000

NRE-63.8 East Castor River at Concession Road 7, Winchester Township
NRE-64.7 East Castor River at Concession Road 6, Winchester Township, east end of Winchester
NRE-65.3 East Castor River at Hwy. #31, south end at Winchester
NR-53.2 Castor River at Concession Road 3, Russell Township, 3/4 mile east of Russell
NR-54.5 Castor River beside River Road, opposite street south of race track - west of Russell
NRS-65.2 South Castor River at Hwy. #31, 1 mile south of Vernon
NL-46.6 Little Castor River just upstream of junction with tributary, 0.5 miles east of Russell-Cambridge Township line
NL-47.2 Little Castor River at Russell-Cambridge Township line
N-44.8 South Nation River just west of St. Albert on Concession Road 9, Cambridge Twp.
NY-47.0 Payne River at Concession Road 9, Finch Township
N-47.7 South Nation River at Crysler side road, north of Crysler

TABLE II - cont'd.

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

All analyses except pH reported in p.p.m. unless otherwise indicated

RIVER SURVEY

1 p.p.m. = 1 mgm. / litre = 1 lb./100,000 Imp. Gals.

Watershed: South Nation

Watercourse:

Date Sampled: Oct. 1/63 by: R. C. Manson

Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			D.O.	Sample Temp. C	Turbidity Units		Bacteriological Laboratory	
			Total	Susp.	Diss.					Lab. No.	M.F. Coliform Count per 100 ml.
N-48.3	R-5020	1.8	290	-	-			7.0		R-15840	50
NU-58.0	R-5019	2.0	392	-	-			3.3		R-15839	34
N-58.0	R-5040	1.7	278	-	-			2.3		R-15852	1,030
N-58.6	R-5039	1.4	282	-	-			1.3		R-15851	900
NW-69.0	R-5035	1.7	398	-	-			23.0		R-15847	9,000
NW-71.8	R-5033	15.	776	-	-			31.0		R-15845	430,000
NW-71.81	R-5034	11.	726	-	-			34.0		R-15846	190,000
N-65.1	R-5036	1.4	244	-	-			11.5		R-15848	14

N-48.3		South Nation River at Concession Road 9, Finch Township, just west of abandoned NYC Railroad
NU-58.0		Dunbar Creek at Highway #43 (Concession Road 2, Winchester Twp)
N-58.0		South Nation River at dam just east of Chesterville
N-58.6		South Nation River just west of Chesterville
NW-69.0		Williamsburg Creek at Hwy. #31 just north of Concession Road 6, Williamsburg Twp.
NW-71.8		Williamsburg Creek at Williamsburg County Road
NW-71.81		Williamsburg Creek - 50 ft. south of Williamsburg County Road
N-65.1		South Nation River at Cass Bridge

TABLE II - cont'd.

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

All analyses except pH reported in p.p.m. unless otherwise indicated

RIVER SURVEY

1 p.p.m. = 1 mgm. / litre = 1 lb./100,000 Imp. Gals.

TABLE II - cont'd.

Watershed: South Nation River

Watercourse:

Date Sampled: Sept. 30.63 by: R. C. Manson

Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			D.O.	Sample Temp. C			Bacteriological Laboratory	
			Total	Susp.	Diss.					Lab. No.	M.F. Coliform Count per 100 ml.
NF-69.4	R-4971	3.0	522	45	477					R-15648	7,000
NFX-72.0		No Flow									
NFX-76.1		No Flow									
NFD-75.0		No Flow									
NFD-76.6		No Flow									
NF-75.5	R-4970	2.2	328	30	298					R-15647	180
NK-72.7	R-4969	3.4	416	112	304					R-15646	90,000
N-74.8	R-4968	2.2	264	9	255					R-15645	170
N-88.2	R-4967	1.7	296	2	294					R-15644	600
N-96.0	-	Broken in Transit								R-15643	32

NF-69.4	Black Creek at Matilda - Mountain Township line just above junction
NFX-72.0	Sandy Creek at Concession Road 7, Matilda Township, just east of Hulbert
NFX-76.1	Sandy Creek at Hainsville side road east side, in Concession 6, Matilda Twp.
NFD-75.0	Dixons Corners Creek at Concession Road 5, Matilda Township, west of Brinston
NFD-76.6	Dixons Corners Creek at Concession Road 4, Matilda Township, west of Dixons Corners
NF-75.5	Black Creek at Concession Road 5, Matilda Township
NK-72.7	Inkerman Creek at Inkerman side road, 1 mile south of Inkerman
N-74.8	South Nation River beside South Mountain Road, 3/4 miles east of South Mountain
N-88.2	South Nation River below dam at Spencerville and below Highway #16
N-96.0	South Nation River at Charleville

INTERPRETATION OF ANALYSES

The analyses employed in this investigation to assess the quality of the surface water are as follows:

Biochemical Oxygen Demand (BOD)

The BOD of sewage, polluted waters or industrial wastes is the oxygen required for stabilization (natural purification in a stream) of the decomposable organic matter or chemical material by aerobic biochemical action. Unless otherwise noted, a five-day BOD determination with incubation at 20°C is reported. A high BOD is indicative of organic or chemical pollution. A desirable upper limit in natural water commonly is four (4) parts per million.

Membrane Filter Coliform Count

The membrane filter technique is employed to obtain a direct enumeration of coliform organisms and is reported per 100 millilitres. The presence of coliforms indicates pollution from human or animal excrement, or from some non-faecal forms. A membrane filter coliform count in excess of the desirable upper limit of 2,400 organisms is considered to render the waters undesirable for bathing purposes.

Solids

The analyses for solids include tests for total, suspended, and dissolved solids. The first test measures both the solids in solution and in suspension. The results are reported in parts per million.

The suspended solids indicate the measure of undissolved solids of organic or inorganic nature in suspension. Land erosion, sewage, and industrial wastes are significant sources of suspended solids. The effect of suspended solids in water is reflected in difficulties associated with water purification and deposition in streams which could interfere with navigation and injure the habitat of fish. Where

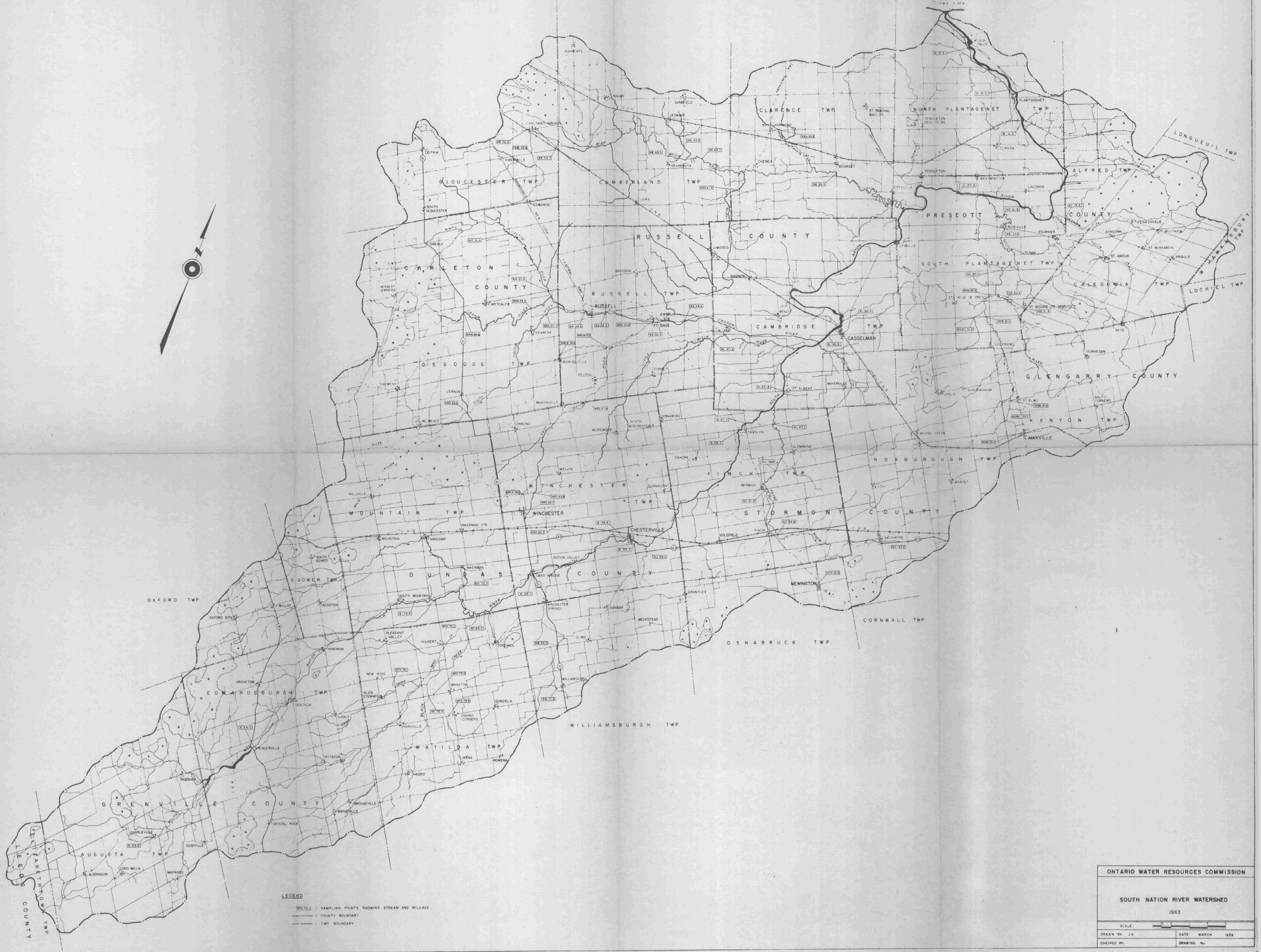
suspended solids values, ascertained by a quantitative analysis, approach 20 parts per million or less, laboratory difficulties usually result in these values being determined as turbidity, a qualitative analysis.

The dissolved solids are a measure of those solids in solution.

Turbidity

Turbidity is a measure of the optical properties of the fine suspended solids, such as clay, silt and finely divided organic matter, which cause light to be scattered or absorbed rather than be transmitted in straight lines through the sample of water. The results are reported in turbidity units.

Where suspended solids values approach 20 parts per million or less the values of suspended matter are usually determined as turbidity. Any attempt to correlate turbidity with the weight concentration of the suspended matter is impractical.



ONTARIO WATER RESOURCES COMMISSION

SOUTH NATION RIVER WATERSHED

1963

SCALE:	
DRAWN BY: J.H.	DATE: MARCH 1959
CHECKED BY:	DRAWING No